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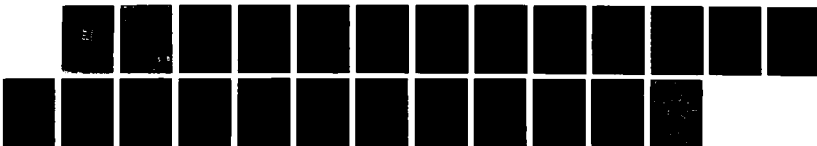
PROGRAM MAINTENANCE MANUAL(U) ADMINISTRATIVE SCIENCES
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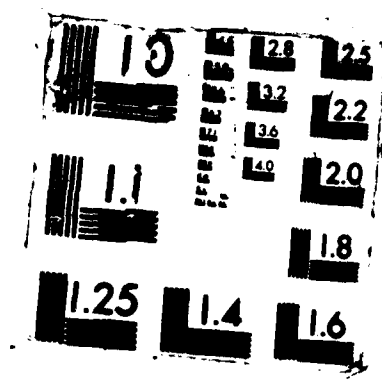
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PROGRAM
MAINTENANCE
MANUAL

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PROGRAM MAINTENANCE MANUAL

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CHAPTER I

DISCUSSION

CAM is written in BASIC. The code for CAM has been carefully structured to meet the following conditions:

- 1) The software is composed of modularized programs with each module being functionally discrete.
- 2) Each module has a flexible and modifiable substruction.
- 3) Each module has minimal dependence of the operation of a module on the internal details of another.
- 4) The code is self explanatory with extensive, embedded documentation and with input and output specifications provided in each module header block.
- 5) The code has been written so that no portion of the software is explicitly dependent upon the properties of the operating system except for the general provision that the software must be run under DOS, version 2.0 or higher.

CAM has three components - CAM, CAM2, and CAM3. Source code for CAM is presented in Chapter II, Sections A, B, and C. CAM gets the user up and running by first presenting the introductory text and get transferring control of the program to CAM2 which does the actual computations. If feasibility analysis is required, then CAM3 is called by either CAM or CAM3.

Because of the embedded comments and clear logical flow, users familiar with BASIC can easily follow the code. Users wishing to understand what the computational procedures are doing should consult Volume I, Chapter 6.

CHAPTER II

PROGRAM LISTING

```

10 'COMPETITION ANALYSIS MODEL      "CAM.BAS"
20 DEFINT I
30 COMMON IW
40 KEY OFF:IW=0:WIDTH "LPT1:",80
50 CLS:LOCATE 2,33:PRINT"Welcome to":LOCATE 4,26:PRINT"COMPETITION ANALYSIS MODE
L"
60 LOCATE 7,23:PRINT"* * * * * "
70 LOCATE 9,23:PRINT"          C A M          "
80 LOCATE 11,23:PRINT"* * * * * "
90 LOCATE 20,21:PRINT"Administrative Sciences Corp. 1987"
100 LOCATE 24,25:GOSUB 570
110 CLS:PRINT TAB(30);"PURPOSE":PRINT
120 PRINT"      CAM, the Competition Analysis Model, helps you do a cost analysis"
130 PRINT"      of production competition. It will be valuable only if you take"
140 PRINT"      care to assemble realistic assumptions. CAM has the ability to"
150 PRINT"      simplify sensitivity analyses, and it can perform various"
160 PRINT"      breakeven analyses where second source parameter values are"
170 PRINT"      determined that equate costs under Sole Source and Competition."
180 PRINT:PRINT TAB(30);"METHODOLOGY":PRINT
190 PRINT"      The model calculates competitive savings by comparing estimat
ed"
200 PRINT"      SOLE SOURCE costs with estimated COMPETITIVE costs. To use the"
210 PRINT"      model, establish a set of base case parameters based on sole sourc
e"
220 PRINT"      assumptions. Then, enter data for the same case using parameters"
230 PRINT"      expected in a competitive environment. After performing this"
240 PRINT"      base case analysis, sensitivity analysis can be conducted on"
250 PRINT"      each parameter."
260 PRINT:PRINT"      The model will prompt each response. Detailed instructi
ons are"
270 PRINT"      found in the accompanying user's manual.":PRINT:GOSUB 570
280 '
290 CLS:PRINT" Is your printer set for 132 columns (or more)? If not and you wan
t wide"
295 PRINT" screen, hit Control Break and set printer before running the program.
"
300 PRINT:INPUT" ENTER THE APPROPRIATE LETTER (Y)es or (N)o":QS
310 IF QS="Y" OR QS="y" THEN IW=1:WIDTH "LPT1:",132:GOTO 320
315 IF QS<>"N" AND QS<>"n" THEN BEEP:GOTO 300
320 CLS:PRINT" CAM allows you to do the following:"
330 PRINT"      (1) Input, change, or display data"
340 PRINT"      (2) Analyze competition when the factors are known"
350 PRINT"      (3) Perform breakeven analysis when all factors are known except on
e"
360 PRINT:GOSUB 570
370 CLS:PRINT" The program is designed to accept data input from the terminal or
from data"
380 PRINT" files on diskette. Terminal input accepts data in the following order
:"
390 PRINT"      # of years during which costs will be incurred"
400 PRINT"      First year (a two digit code such as 87)"
410 PRINT"      Discount rate at which future costs are converted to present value
"
420 PRINT"      Sole Source, 1st Competitive Source, 2nd Competitive Source"
430 PRINT"      Non-Recurring Costs by Year, Quantity By Year, 1st Unit Cost,"
440 PRINT"      Progress (Learning) & Production (Lot Size) Rate Parameters"
450 PRINT"      Timing of Shift/Rotation in Progress Rate Parameter (specified by
year"

```



```

460 PRINT"      or unit # of sole source production schedule). A shift to a lowe
r/more"
470 PRINT"      efficient progress curve and/or steeper progress curve can be en
tered"
480 PRINT"      for the 1st or 2nd competitive source or both. The user may spec
ify up"
490 PRINT"      to 5 different times for shift/rotation, or none."
500 PRINT:PRINT" You will be given menu prompts. When you make a selection you w
ill move to "
510 PRINT" a lower menu for more specific prompts. You can move back up the menu
"
520 PRINT" hierarchy by typing 'M' for menu up."
530 PRINT:PRINT" There is a HELP facility which is currently on. By typing 'H' a
t the prompt"
540 PRINT" you can toggle this capability from ON to OFF and from OFF to ON."
550 PRINT:GOSUB 570
560 CLS:PRINT"Loading computational program":CHAIN "CAM2"
570 'Press any key subroutine
580 PRINT" PRESS ANY KEY TO CONTINUE"
590 QS=INKEYS:IF QS="" THEN 590
600 RETURN

```

```

10 'COMPETITION ANALYSIS MODEL      "CAM2.BAS"
20 DEFINT I-K,M,N
30 COMMON IW
40 LOG2=LOG(2):IFIRST=0:H=1:IEVEN=0:ON ERROR GOTO 5530
50 '   DIMENSIONED FOR 25 YEARS
60 DIM YR(25),Q(25,5),COST(25,9),P(25),A(3),B(3),C(3),R(3,5),S(3,5)
70 DIM JYR(5),QAMT(5),PCT(5),MESSAGES(3),TCOST(5),Q2(25,3)
80 '   DISPLAY TABLE
90 MESSAGES(2)=" ***** FIRST SOURCE UNDER COMPETITION *****"
100 MESSAGES(3)=" ***** SECOND SOURCE UNDER COMPETITION *****"
110 T0$="          COMPETITION ANALYSIS          "
120 T1$="          *** SOLE SOURCE ***          ***** COMPETITIVE *****"
130 T11$="          DISCOUNT"
140 T2$="          RECUR  N.REC          QUANTITIES *  RECUR  N.REC"
150 T22$="  COMPET  COMPET"
160 T3$="  FY      QTY      COST      COST      1ST      2ND      COST      COST"
170 T33$="  SAVING  SAVING"
180 S1$="          ***** SOLE SOURCE *****          COMPETITIVE          ***1ST COMPET
ITIVE***          ***2ND COMPETITIVE***"
190 S2$="          RECUR  N.REC          TOTAL          QUANTITIES          RECUR  N.REC
TOTAL      RECUR  N.REC          TOTAL"
200 S3$="  FY      QTY      COST      COST      COST      1ST      2ND      COST      COST
COST      COST      COST      COST"
210 D1$="DATA SUMMARY  ":D2$="***** QUANTITIES *****          * NON-RECURRING COST *"
220 D3$="FY      SOLE      1ST C      2ND C      SOLE      1ST C      2ND C"
230 F71$="###,###.##":F80$="###,###":F81$="###,###.##":F85$="###.#####"
240 F90$="###,###,###":F91$="###,###.##":F92$="###,###.##":F93$="###,###.###"
250 CLS
260 CLOSE:PRINT:PRINT " OLD DATA FILES"
270 NFILE=0:FILES "*.CAM":NFILE=1
280 IF H=0 THEN PRINT:PRINT " (O)ld or (N)ew data file, (D)elete file, (F)easibi
lity, (H)elp - turn ON, or (Q)uit":GOTO 320
290 PRINT" (O)ld data file from disk":PRINT" (N)ew data file with data to be ent
ered from the terminal"
300 PRINT" (D)elete old data file from disk"
310 PRINT" (F)easibility analysis of price reduction":PRINT" (H)elp - turn OFF":
PRINT" (Q)uit program and return to operating system"
320 INPUT" ENTER THE APPROPRIATE LETTER";QS
330 IF QS="H" OR QS="h" THEN H=(H+1)MOD 2:GOTO 260
340 IF QS="O" OR QS="o" THEN 410
350 IF QS="N" OR QS="n" THEN 460
360 IF QS="D" OR QS="d" THEN 410
370 IF QS="F" OR QS="f" THEN CLS:PRINT" Loading Feasibility Computation':CHAIN "
CAM3"
380 IF QS="Q" OR QS="q" THEN SYSTEM
390 GOTO 260
400 '**** IFIRST=-1 FOR DATA FILE INPUT, 0 FOR TERMINAL INPUT, 1 AFTERWARDS *
410 INPUT " Name of Data File (8 char or less - do not type .CAM)          ";NFS
420 NFS=NFS+".CAM":IF QS="D" OR QS="d" THEN KILL NFS:GOTO 260
430 OPEN "I",#1,NFS:IFIRST=-1
440 INPUT #1,NYR,IYR:GOTO 520
450 '*** Initialize for terminal input *****
460 FOR J=1 TO 25:COST(J,6)=0:COST(J,7)=0:COST(J,8)=0:NEXT J
470 CLS:PRINT" ENTER each input value at the prompt. If you make an incorrect en
try followed"
480 PRINT" by <cr>, it can be corrected at the end of data entry using CHANGE DA
TA."
490 PRINT:IFIRST=0:INPUT" # OF YEARS          ";NYR

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500 IF NYR>25 THEN PRINT"    Maximum # of Years is 25":GOTO 490
510 INPUT " FIRST FISCAL YR (e.g. 91)                ";IYR
520 GOSUB 2830                                         'D
530 I=1:IF IFIRST>-1 THEN CLS:PRINT" ***** DATA INPUT FOR SOLE SOURCE PRODU
CER *****"
540 K=6:IF IFIRST>-1 THEN PRINT:PRINT" INPUT NON-RECURRING COSTS (Millions of $)
":PRINT
550 GOSUB 3920                                         'COST(J,6)
560 IF IFIRST>-1 THEN PRINT:PRINT" ***** QUANTITIES FOR SOLE SOURCE PRODUCE
R *****":PRINT
570 GOSUB 2870                                         'Q
580 GOSUB 3220                                         'A
590 GOSUB 3290                                         'B
600 GOSUB 3370                                         'C
610 I=2:IF IFIRST>-1 THEN CLS:PRINT" ***** DATA INPUT FOR FIRST SOURCE UNDE
R COMPETITION *****"
620 K=7:IF IFIRST>-1 THEN PRINT:PRINT" INPUT NON-RECURRING COSTS (Millions of $)
":PRINT
630 GOSUB 3920                                         'COST(J,7)
640 IF IFIRST>-1 THEN CLS:PRINT" QUANTITIES FOR FIRST COMPETITIVE SOURCE":PRINT
650 GOSUB 2930                                         'P or Q
660 GOSUB 3220                                         'A
670 GOSUB 3290                                         'B
680 GOSUB 3370                                         'C
690 I=3:IF IFIRST>-1 THEN CLS:PRINT" ***** DATA INPUT FOR SECOND SOURCE UND
ER COMPETITION *****"
700 K=8:IF IFIRST>-1 THEN PRINT:PRINT" INPUT NON-RECURRING COSTS (Millions of $)
":PRINT
710 GOSUB 3920                                         'COST(J,8)
720 GOSUB 3220                                         'A
730 GOSUB 3290                                         'B
740 GOSUB 3370                                         'C
750 IF IFIRST>-1 THEN CLS:PRINT" TIMING OF SHIFT AND ROTATION DUE TO COMPETITION
"
760 GOSUB 3450                                         'FY
770 IF NSR=0 THEN JYR(1)=-100:QAMT(1)=0:GOTO 840
780 FOR ISR=1 TO NSR:IF IFIRST>-1 THEN CLS
790 FOR I=2 TO 3:IF IFIRST>-1 THEN PRINT:PRINT MESSAGES(I)
800     GOSUB 3770:NEXT I                               'S
810 FOR I=2 TO 3:IF IFIRST>-1 THEN PRINT:PRINT MESSAGES(I)
820     GOSUB 3810:NEXT I                               'R
830 NEXT ISR
840     GOSUB 3850                                         'Least Cost
850 IFIRST=1:Q$="D":GOTO 970
860 'Options menu *****
870 IF H=0 THEN 890
880 PRINT:GOSUB 6190
890 PRINT
900 IF H=0 THEN PRINT" (A)nalysis, (B)reakeven, (C)hange data, (D)isplay data, (
P)rint":PRINT" (S)ave data, (H)elp - turn ON, (M)enu up - be sure to save new da
ta first":GOTO 960
910 CLS:PRINT" (A)nalysis - Calculate all costs over the program life":PRINT" (B
)reakeven - Find second source parameter values that lead to same costs":PRINT"
with or without competition"
920 PRINT" (C)hange data - Any input factors may be altered":PRINT" (D)isplay in
put data on screen only"
930 PRINT" (P)rint input data and analysis on printer and screen"
940 PRINT" (S)ave data on disk"
950 PRINT" (H)elp - turn OFF":PRINT" (M)enu change to higher level - be sure to
save new data first"

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960 INPUT" ENTER THE APPROPRIATE LETTER";QS:NYRP=NYR+1:FOR I=1 TO 3:Q(NYRP,I)=0:
NEXT I
970 IF QS="H" OR QS="h" THEN H=(H+1) MOD 2:GOTO 890
980 IF QS="P" OR QS="p" THEN GOSUB 4240:GOSUB 1610:GOTO 870
990 IF QS="D" OR QS="d" THEN GOSUB 4240:GOTO 870
1000 IF QS="A" OR QS="a" THEN GOSUB 1610:GOTO 870
1010 IF QS="S" OR QS="s" THEN GOSUB 5050:GOTO 890
1020 IF QS="B" OR QS="b" THEN GOSUB 5570:GOTO 890
1030 IF QS="M" OR QS="m" THEN 260
1040 IF QS="C" OR QS="c" THEN 1050 ELSE BEEP:GOTO 890
1050 PRINT:IF H=1 THEN 1090
1060 PRINT" (A)first unit cost, (B)progress curve rate, (C)production rate param
"
1070 PRINT" (D)iscount Rate (%), (L)east cost, (N)on-recur Costs, (Q)uantity, (Y
)ears #"
1080 PRINT" (R)otation %, (S)hift %, (T)ime r/s, (#) of r/s, (H)elp - turn ON, (
M)enu up":GOTO 1160
1090 CLS:PRINT" CHANGES ALLOWED":PRINT" (A)first unit cost in $M":PRINT" (B)prog
ress curve rate - e.g. 90% means that the unit cost of the 2Nth unit":PRINT"
will drop to 90% of the cost for the Nth unit"
1100 PRINT" (C)production rate parameter - e.g. 90% means that if the lot size i
n a year":PRINT" doubles, the cost of the 2Nth unit drops to 90% of the Nth
unit cost"
1110 PRINT" (D)iscount Rate (%) - Costs N years in the future are divided by":PR
INT" (1+r) raised to the Nth power to reflect their present value"
1120 PRINT" (L)east cost by assigning larger quantities to lowest cost producer.
"
1130 PRINT" (N)on-recurring Costs":PRINT" (Q)uantity of production by year for e
ither source":PRINT" (Y)ears # in production schedule"
1140 PRINT" (R)otation % for progress curve at time of rotation/shift":PRINT" (S
)hift % for progress curve at time of rotation/shift":PRINT" (T)ime of rotation/
shift - either year or unit #"
1150 PRINT" (#) of rotation/shifts (maximum 5) or change type (year/unit)":PRINT
" (H)elp - turn OFF":PRINT" (M)enu change to higher level"
1160 INPUT" ENTER THE APPROPRIATE LETTER";QS
1170 IF QS="H" OR QS="h" THEN H=(H+1) MOD 2:GOTO 1050
1180 IF QS<>"A" AND QS<>"a" THEN 1220
1190 GOSUB 4670:IF I1=4 THEN 1050
1200 PRINT" FIRST UNIT COST now=";A(I1);:INPUT A(I1)
1210 GOTO 1190
1220 IF QS<>"B" AND QS<>"b" THEN 1270
1230 GOSUB 4670:IF I1=4 THEN 1050
1240 IF H=1 THEN GOSUB 5400
1250 PRINT" PROGRESS CURVE RATE now=";B(I1);:INPUT B(I1)
1260 GOTO 1230
1270 IF QS<>"C" AND QS<>"c" THEN 1330
1280 GOSUB 4670:IF I1=4 THEN 1050
1290 IF H=1 THEN GOSUB 5420
1300 PRINT" PRODUCTION RATE PARAMETER now=";C(I1);:INPUT C(I1)
1310 IF C(I1)=0 THEN C(I1)=100
1320 GOTO 1280
1330 IF QS<>"R" AND QS<>"r" THEN 1380
1340 GOSUB 4750:IF I1=4 THEN 1050
1350 IF H=1 THEN GOSUB 5450:GOSUB 5520
1360 PRINT" ROTATION now=";R(I1,ISR);:INPUT R(I1,ISR)
1370 GOTO 1340
1380 IF QS<>"S" AND QS<>"s" THEN 1430
1390 GOSUB 4750:IF I1=4 THEN 1050
1400 IF H=1 THEN GOSUB 5450:GOSUB 5510

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1410 PRINT" SHIFT now=";S(I1,ISR);:INPUT S(I1,ISR)
1420 GOTO 1390
1430 IF QS="D" OR QS="d" THEN GOSUB 2830:GOTO 1050
1440 'IF QS="I" OR QS="i" THEN GOSUB 4040:GOTO 1250
1450 IF QS="N" OR QS="n" THEN GOSUB 3920:GOTO 1050
1460 'IF QS="O" OR QS="o" THEN GOSUB 4380:GOTO 1250
1470 IF QS<>"Q" AND QS<>"q" THEN 1550
1480 PRINT" (S)ole Source Qty (all), (C)ompetitive Qty (all), (Y)ear (1),
(M)enu up"
1490 INPUT" ENTER THE APPROPRIATE LETTER":RS
1500 IF RS="S" OR RS="s" THEN GOSUB 2870
1510 IF RS="C" OR RS="c" THEN GOSUB 2930
1520 IF RS="Y" OR RS="y" THEN GOSUB 3140
1530 IF RS="M" OR RS="m" THEN 1050
1540 GOTO 1480
1550 IF QS="L" OR QS="l" THEN GOSUB 3850:GOTO 1050
1560 IF QS="T" OR QS="t" THEN GOSUB 4870:GOTO 1050
1570 IF QS="#" THEN GOSUB 3450:GOTO 1050
1580 IF QS="Y" OR QS="y" THEN GOSUB 4170:GOTO 1050
1590 IF QS="M" OR QS="m" THEN 890
1600 BEEP:GOTO 1050
1610 '*****
1620 ' SUBROUTINE TO CALCULATE COSTS
1630 '*****
1640 ' NSR is # of shift/rotations
1650 ' NOYEAR=1 means no year for S/R (JYR(ISR)=-100)
1660 ' NOQUANT=1 means no quantity (QAMT(ISR)=0)
1670 ' QAMT(ISR) is set to quantity at which shift/rotation occurs
1680 ' PCT(ISR) is cumulative percent during s/r year
1690 IF NSR=0 THEN NOYEAR=1:NOQUANT=1:QAMT(1)=100000!:JYR(1)=-100:GOTO 1800
1700 FOR ISR=1 TO NSR
1710 NOYEAR=0:IF JYR(ISR)=-100 THEN NOYEAR=1
1720 NOQUANT=0:IF QAMT(ISR)=0 THEN NOQUANT=1
1730 IF NOYEAR=1 AND NOQUANT=1 THEN QAMT(ISR)=100000!:GOTO 1770
1740 IF NOYEAR=1 THEN 1770 'QAMT(ISR)>0
1750 QOLD=0:FOR J=1 TO NYR:IF JYR(ISR)=IYR+J-1 THEN QAMT(ISR)=QOLD+1:GOTO 177
0
1760 QOLD=QOLD+Q(J,1):NEXT J
1770 NEXT ISR
1780 '
1790 IF H=1 THEN PRINT:PRINT" The help option shows the detail for the calculati
on of recurring cost.":PRINT" This is done for the sole source by year, followed
by the 1st":PRINT" and then 2nd sources under competition, each by year."
1800 NYRP=NYR+1:FOR II=1 TO (3+IMIN*2):I=II:ISR=1:IF I>3 THEN I=I-2
1810 AA=A(I):BP1=LOG(.01*B(I))/LOG2+1:CP1=LOG(.01*C(I))/LOG2:QOLD=0:DEN=1!
1820 FOR J=1 TO NYR:CST=0
1830 FRACT=1:RATIO=1
1840 IF II<>1 THEN 1890
1850 'Find % Splits when QAMT(ISR)>0 and II=1 *****
1860 IF QOLD<QAMT(ISR) AND QAMT(ISR)<=QOLD+Q(J,1) THEN PCT(ISR)=(QAMT(ISR)-1
-QOLD)/Q(J,1):JYR(ISR)=IYR+J-1 ELSE 1890
1870 IF ISR<NSR THEN ISR=ISR+1:GOTO 1860
1880 GOTO 2140
1890 'II>1 *****
1900 RATIO=1:IF Q(J,1)>0 THEN RATIO=Q(J,I)/Q(J,1)
1910 -1950
1920 'Calculate minimum costs when no S/R *****
1930 IF NSR=0 AND Q(J,1)>0 AND II>3 THEN RATIO=Q(J,7-II)/Q(J,1)
1940 IF II>3 THEN Q(J,II)=0
1950 'Shift and Rotation Year and II>1 *****

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1960 IF JYR(ISR)<>IYR+J-1 GOTO 2140
1970 QQ=PCT(ISR)*Q(J,1)*RATIO:IF II>3 THEN Q(J,II)=Q(J,II)+QQ
1980 QNEW=QOLD+QQ:GOSUB 5210
1990 QOLD=QNEW
2000 IF H=1 AND II<4 THEN PRINT" SHIFT/ROTATION #";ISR;:PRINT" *****
*****"
2010 'Compute Shift and Rotation *****
2020 BP2=LOG(.0001*(100-R(I,ISR))*B(I))/LOG2+1
2030 AA=AA*(1-S(I,ISR)/100)
2040 IF QOLD>0 THEN AA=AA*QOLD^(BP1-BP2)
2050 BP1=BP2
2060 'Augment ISR and check to see if next s/r in same year *****
2070 'Subtract previous cum % in same year *****
2080 ISR=ISR+1
2090 IF ISR>1 AND Q(J,1)>0 AND II>3 THEN RATIO=Q(J,7-II)/Q(J,1)
2100 IF ISR>NSR OR JYR(ISR)<>JYR(ISR-1) THEN FRACT=1-PCT(ISR-1):GOTO 2140
2110 QQ=(PCT(ISR)-PCT(ISR-1))*Q(J,1)*RATIO:IF II>3 THEN Q(J,II)=Q(J,II)+QQ
2120 GOTO 1980
2130 'Finish last part of lot cost *****
2140 QQ=FRACT*Q(J,1)*RATIO:IF II>3 THEN Q(J,II)=Q(J,II)+QQ
2150 QNEW=QOLD+QQ
2160
2170 GOSUB 5210 'Lot Cost
2180 QOLD=QNEW:IF J>1 THEN DEN=DEN*(1+.01*D)
2190 TCOST(II)=CST/DEN
2200 COST(J,II)=CST
2210 NEXT J
2220 NEXT II
2230 IF NSR=0 THEN 2290
2240 FOR ISR=1 TO NSR
2250 IF NOYEAR=1 THEN JYR(ISR)=-100
2260 IF NOQUANT=1 THEN QAMT(ISR)=0
2270 NEXT ISR
2280
2290 'II=2 to indicate that 1st and 2nd competitive source qtys changed
2300 II=0:IF IMIN=0 THEN 2320
2310 IF TCOST(2)+TCOST(3)>TCOST(4)+TCOST(5) THEN II=2
2320 DEN=1::CONE=0:COST(NYRP,9)=0:FOR J=1 TO NYR
2330 IF J>1 THEN DEN=DEN*(1+.01*D)
2340 COST(J,9)=(COST(J,1)-COST(J,II+2)-COST(J,II+3)+COST(J,6)-COST(J,7)-COST(J,
8))/DEN:CONE=CONE+(COST(J,1)+COST(J,6))/DEN
2350 COST(NYRP,9)=COST(NYRP,9)+COST(J,9):NEXT J
2360 IF IEVEN=1 THEN RETURN
2370 'Generate Output *****
2380 IF IEVEN=0 THEN CLS ELSE COST(NYRP,9)=0
2390 PRINT T0$,DATES,TIMES:PRINT
2400 PRINT T1$;T1$
2410 PRINT T2$;T2$
2420 PRINT T3$;T3$
2430 FOR K=1 TO 8
2440 COST(NYRP,K)=0
2450 IF K<=5 THEN Q(NYRP,K)=0
2460 NEXT K
2470 PRINT:FOR J=1 TO NYRP
2480 IF J<NYRP THEN PRINT USING " ##";(IYR+J-1) MOD 100; ELSE PRINT:PRINT"TO
T";
2490 PRINT USING F90$;Q(J,1);:PRINT USING F91$;COST(J,1);:PRINT USING F71$;C
OST(J,6);:PRINT USING F90$;Q(J,II+2);:PRINT USING F80$;Q(J,II+3);:PRINT USING F9
1$;COST(J,II+2)+COST(J,II+3);
2500 PRINT USING F71$;COST(J,7)+COST(J,8);:PRINT USING F81$;COST(J,1)-COST(J
,II+2)-COST(J,II+3)+COST(J,6)-COST(J,7)-COST(J,8);COST(J,9)

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2510     IF J=NYRP THEN 2560
2520     FOR K=1 TO 8
2530         COST(NYRP,K)=COST(NYRP,K)+COST(J,K)
2540         IF K<=5 THEN Q(NYRP,K)=Q(NYRP,K)+Q(J,K)
2550     NEXT K
2560 NEXT J
2570 IF IEVEN=0 THEN 2600
2580 PRINT:INPUT"ENTER Shift PrtScr to Print. or RETURN TO CONTINUE";QS
2590 RETURN
2600 PRINT:IF COST(NYRP,9)>0 THEN PRINT" Competitive Saving as % of Sole Source
(Discounted) ="; ELSE PRINT" Competitive Losses as % of Sole Source (Discounted)
=";
2610 PRINT USING F71$;ABS(100*COST(NYRP,9)/CONE)
2620 IF QS<>"P" AND QS<>"p" THEN RETURN
2630 LPRINT:LPRINT:LPRINT TOS,DATES,TIMES:LPRINT:IF IW=1 THEN 2670
2640 LPRINT T1$;T11$
2650 LPRINT T2$;T22$
2660 LPRINT T3$;T33$:GOTO 2700
2670 LPRINT S1$;T11$
2680 LPRINT S2$;T22$
2690 LPRINT S3$;T33$
2700 LPRINT:FOR J=1 TO NYRP
2710     IF J<NYRP THEN LPRINT USING " ##";(IYR+J-1) MOD 100; ELSE LPRINT:LPRINT
"TOT";
2720     LPRINT USING F90$;Q(J,1);:LPRINT USING F91$;COST(J,1);:LPRINT USING F71
$;COST(J,6);
2730     IF IW=1 THEN LPRINT USING F91$;COST(J,1)+COST(J,6);
2740     LPRINT USING F90$;Q(J,II+2);:LPRINT USING F80$;Q(J,II+3);
2750     IF IW=0 THEN LPRINT USING F91$;COST(J,II+2)+COST(J,II+3);:LPRINT USING
F71$;COST(J,7)+COST(J,8);
2760     IF IW=1 AND II=0 THEN LPRINT USING F91$;COST(J,2);:LPRINT USING F71$;COST
(J,7);:LPRINT USING F91$;COST(J,2)+COST(J,7);COST(J,3);:LPRINT USING F71$;COST(J
,8);:LPRINT USING F91$;COST(J,3)+COST(J,8);
2770     IF IW=1 AND II=2 THEN LPRINT USING F91$;COST(J,4);:LPRINT USING F71$;COST
(J,8);:LPRINT USING F91$;COST(J,4)+COST(J,8);COST(J,5);:LPRINT USING F71$;COST(J
,7);:LPRINT USING F91$;COST(J,5)+COST(J,7);
2780     LPRINT USING F81$;COST(J,1)-COST(J,II+2)-COST(J,II+3)+COST(J,6)-COST(J,
7)-COST(J,8);COST(J,9)
2790 NEXT J
2800 LPRINT:IF COST(NYRP,9)>0 THEN LPRINT" Competitive Saving as % of Sole Sourc
e (Discounted) ="; ELSE LPRINT" Competitive Losses as % of Sole Source (Discount
ed) =";
2810 LPRINT USING F71$;ABS(100*COST(NYRP,9)/CONE)
2820 LPRINT CHR$(12):RETURN
2830 'D DISCOUNT RATE - *****
2840 IF IFIRST=-1 THEN INPUT #1,D:RETURN
2850 PRINT" DISCOUNT RATE (% or <cr> if 0)";:IF IFIRST=1 THEN PRINT" now =";D;:
INPUT D ELSE INPUT"
";D
2860 RETURN
2870 'Q(YR,I) QUANTITY - *****
2880 FOR J=1 TO NYR
2890 IF IFIRST>-1 THEN PRINT USING " ##";(IYR+J-1) MOD 100;:INPUT" QUANTITY =
=";Q(J,1) ELSE INPUT #1,Q(J,1)
2900 II=Q(J,1)*P(J)/100:Q(J,2)=II:Q(J,3)=Q(J,1)-Q(J,2):NEXT J
2910 IF IFIRST>-1 THEN PRINT
2920 RETURN
2930 'Quantities for both OR % for First Source under Competition *****
2940 ISW=0:IF IFIRST=-1 THEN 3000

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2950 PRINT" (P)ercent of sole source for 1st source under competition, (Q)uantit
ies"
2960 INPUT" ENTER THE APPROPRIATE LETTER";QS
2970 IF QS="P" OR QS="p" THEN ISW=1:GOTO 3000
2980 IF QS="Q" OR QS="q" THEN ISW=0:GOTO 3000
2990 GOTO 2950
3000 FOR J=1 TO NYR
3010 IF IFIRST=-1 THEN INPUT #1,Q(J,2):GOTO 3040
3020 PRINT USING "    ##";(IYR+J-1) MOD 100;:IF ISW=1 THEN INPUT"    PERCENT OF SO
LE SOURCE QTY (0-100)    = ";P(J) ELSE INPUT"    FIRST COMPETITIVE SOURCE QUANTITY
    =";Q(J,2):GOTO 3040
3030 IF P(J)<0 OR P(J)>100 THEN BEEP:GOTO 3020 ELSE II=Q(J,1)*P(J)/100:Q(J,2)=II
:Q(J,3)=Q(J,1)-Q(J,2)
3040 NEXT J
3050 IF IFIRST>-1 THEN PRINT
3060     IF ISW=1 THEN RETURN
3070 IF IFIRST=0 THEN PRINT" QUANTITIES FOR SECOND COMPETITIVE SOURCE":PRINT
3080 FOR J=1 TO NYR
3090 IF IFIRST=-1 THEN INPUT #1,Q(J,3)
3100 IF IFIRST>-1 THEN PRINT USING "    ##";(IYR+J-1) MOD 100;:INPUT"    SECOND CO
MPETITIVE SOURCE QUANTITY=";Q(J,3)
3110 NEXT J
3120 IF IFIRST>-1 THEN PRINT
3130     RETURN
3140 '1 Year - Quantity for SS & First Source under Competition *****
3150 INPUT"    YEAR                                = ";JJ
3160 J=JJ-IYR+1
3170 IF J<1 THEN J=J+100:GOTO 3170
3180 PRINT"    SOLE SOURCE QUANTITY                now =";:PRINT USING"    #####";Q(J,1);
:INPUT"    = ";Q(J,1)
3190 PRINT"    1ST COMPETITIVE SOURCE QUANTITY now =";:PRINT USING"    #####";Q(J,2);
:INPUT"    = ";Q(J,2)
3200 PRINT"    2ND COMPETITIVE SOURCE QUANTITY now =";:PRINT USING"    #####";Q(J,3);
:INPUT"    = ";Q(J,3)
3210 PRINT:RETURN
3220 'A(I) FIRST UNIT COST - *****
3230 IF IFIRST>-1 AND I=2 THEN PRINT:PRINT" TYPE <cr> TO COPY SOLE SOURCE VALUE"
;:PRINT A(1)
3240 IF IFIRST>-1 AND I=3 THEN PRINT:PRINT" TYPE <cr> TO COPY FIRST COMPETITIVE
SOURCE VALUE";:PRINT A(2)
3250 IF IFIRST>-1 THEN PRINT:INPUT" FIRST UNIT COST ($M) A=
";A(I) ELSE INPUT #1,A(I)
3260 IF A(I)=0 AND I>1 THEN A(I)=A(I-1):IF IFIRST>-1 THEN PRINT TAB(47);A(I)
3270 IF A(I)=0 AND I=1 THEN 3250
3280     RETURN
3290 'B(I) PROGRESS CURVE RATE - *****
3300 IF H=1 AND IFIRST>-1 THEN GOSUB 5400
3310 IF IFIRST>-1 AND I=2 THEN PRINT:PRINT" TYPE <cr> TO COPY SOLE SOURCE VALUE"
;:PRINT B(1)
3320 IF IFIRST>-1 AND I=3 THEN PRINT:PRINT" TYPE <cr> TO COPY FIRST COMPETITIVE
SOURCE VALUE";:PRINT B(2)
3330 IF IFIRST>-1 THEN PRINT:INPUT" PROGRESS CURVE RATE (%)=
";B(I) ELSE INPUT #1,B(I)
3340 IF B(I)=0 AND I>1 THEN B(I)=B(I-1):IF IFIRST>-1 THEN PRINT TAB(47);B(I)
3350 IF B(I)=0 AND I=1 THEN 3300
3360     RETURN
3370 'C(I) PRODUCTION RATE PARAMETER - *****
3380 IF H=1 AND IFIRST>-1 THEN GOSUB 5420

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3390 IF IFIRST>-1 AND I=2 THEN PRINT:PRINT" TYPE <cr> TO COPY SOLE SOURCE VALUE"
;:PRINT C(1)
3400 IF IFIRST>-1 AND I=3 THEN PRINT:PRINT" TYPE <cr> TO COPY FIRST COMPETITIVE
SOURCE VALUE";:PRINT C(2)
3410 IF IFIRST>-1 THEN PRINT:INPUT" PRODUCTION RATE PARAMETER (%)="
";C(I) ELSE INPUT #1,C(I)
3420 IF C(I)=0 AND I>1 THEN C(I)=C(I-1):IF IFIRST>-1 THEN PRINT TAB(47);C(I)
3430 IF C(I)=0 AND I=1 THEN C(1)=100
3440 RETURN
3450 'JYR WHEN SHIFT AND ROTATION OCCUR *****
3460 'Note that JYR(ISR)=-100 when no year, QAMT(ISR)=0 when no qty: one must be
that
3470 IF IFIRST=-1 THEN INPUT #1,NSR:IF NSR>0 THEN FOR ISR=1 TO NSR:INPUT #1,JYR(
ISR),QAMT(ISR):NEXT ISR
3480 IF IFIRST=-1 THEN RETURN
3490 IF H=1 THEN GOSUB 5450
3500 INPUT" Number of shifts/rotations ";NSR
3510 IF NSR>5 OR NSR<0 THEN PRINT" ERROR: MUST BE BETWEEN 0 AND 5":GOTO 3490
3520 IF NSR=0 THEN RETURN
3530 FOR ISR=1 TO NSR:IF IFIRST=0 THEN JYR(ISR)=-100:QAMT(ISR)=0
3540 NEXT ISR
3550 CLS:PRINT" Shifts/Rotations indicated by (U)nit # or (Y)ear?"
3560 INPUT" ENTER THE APPROPRIATE LETTER";QSR$
3570 IF QSR$="U" OR QSR$="u" THEN 3700
3580 IF QSR$="Y" OR QSR$="y" THEN 3610
3590 BEEP:GOTO 3550
3600 '
3610 II=(IYR+NYR-1) MOD 100:FOR ISR=1 TO NSR:IF ISR=1 THEN J=IYR ELSE J=(JYR(ISR
-1)+1) MOD 100
3620 IF J-II=1 THEN J=II
3630 PRINT:PRINT" SHIFT/ROTATION #";:PRINT USING" #";ISR;:PRINT" YEAR (";:PRIN
T USING"##";J;:PRINT" - ";:PRINT USING"##";II;:PRINT") =":QAMT(ISR)=0
3640 IF JYR(ISR)>-100 THEN PRINT" now =":PRINT JYR(ISR) MOD 100; ELSE PRIN
T SPC(12);
3650 PRINT SPC(30);:INPUT JYR(ISR)
3660 IF JYR(ISR)-IYR+1<0 THEN JYR(ISR)=JYR(ISR)+100
3670 IF JYR(ISR)-IYR+1>NYR THEN PRINT" INPUT ERROR - YEAR IS TOO LARGE":GOTO 363
0
3680 NEXT ISR:RETURN
3690 '
3700 FOR ISR=1 TO NSR
3710 PRINT:PRINT" SHIFT/ROTATION #";:PRINT USING" #";ISR;:PRINT" :SOLE SOURCE
UNIT AT WHICH S/R OCCURS":JYR(ISR)=-100
3720 IF QAMT(ISR)>0 THEN PRINT" now =":QAMT(ISR); ELSE PRINT SPC(20);
3730 PRINT SPC(30);:INPUT QAMT(ISR)
3740 IF ISR>1 AND QAMT(ISR)<=QAMT(ISR-1) THEN PRINT" INPUT ERROR - AMOUNTS MUST
INCREASE":BEEP:GOTO 3710
3750 NEXT ISR:RETURN
3760 '*****
3770 'S SHIFT OF FIRST PROGRESS CURVE *****
3780 IF IFIRST>-1 AND H=1 AND I=2 THEN GOSUB 5510
3790 IF IFIRST>-1 THEN PRINT:PRINT" S/R #";:PRINT ISR;:INPUT" - DOWNWARD SHIFT (
%)
= ";S(I,ISR) ELSE INPUT #1,S(I,ISR)
3800 RETURN
3810 'R ROTATION OF FIRST PROGRESS CURVE *****
3820 IF IFIRST>-1 AND H=1 AND I=2 THEN GOSUB 5520
3830 IF IFIRST>-1 THEN PRINT:PRINT" S/R #";:PRINT ISR;:INPUT" - STEEPER ROTATION
(%)
= ";R(I,ISR) ELSE INPUT #1,R(I,ISR)
3840 RETURN
3850 'Minimize Costs by allocating larger qty to lower cost producer

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3860 IF IFIRST=-1 THEN INPUT #1,IMIN:RETURN
3870 PRINT:PRINT" MINIMIZE COSTS BY ALLOCATING LARGER COMPETITIVE QUANTITIES"
3880 INPUT" TO LOWER COST PRODUCER: Enter (Y/N) ";QS
3890 IMIN=0:IF QS="Y" OR QS="y" THEN IMIN=1:GOTO 3910
3900 IF QS<>"N" AND QS<>"n" THEN BEEP:GOTO 3870
3910 PRINT:RETURN
3920 'Q(YR,4) Non-Recurring Costs - *****
3930 IF IFIRST=-1 THEN 4140
3940 IF IFIRST=1 THEN 3990
3950 INPUT" Do you want non-recurring costs (Y/N)";QS
3960 PRINT:IF QS="N" OR QS="n" THEN FOR J=1 TO NYR:COST(J,K)=0:NEXT J:RETURN
3970 IF QS<>"Y" AND QS<>"y" THEN BEEP:GOTO 3950
3980 IF IFIRST=0 THEN 4140
3990 PRINT" (S)ole Source, (1)st Competitive, (2)nd Competitive, (M)enu up":INPU
T" ENTER S, 1, 2, or M";QS
4000 IF QS="S" OR QS="s" THEN K=6:GOTO 4050
4010 IF QS="1" THEN K=7:GOTO 4050
4020 IF QS="2" THEN K=8:GOTO 4050
4030 IF QS="M" OR QS="m" THEN RETURN
4040 BEEP:GOTO 3990
4050 PRINT:INPUT" (A)ll years, (S)ingle year, (M)enu up: Enter A, S, or M";QS
4060 IF QS="M" OR QS="m" THEN PRINT:GOTO 3990
4070 IF QS="A" OR QS="a" THEN 4140
4080 INPUT" YEAR = ";JJ
4090 J=JJ-IYR+1
4100 IF J<1 THEN J=J+100:GOTO 4100
4110 IF J>25 THEN PRINT" INPUT ERROR":BEEP:GOTO 4080
4120 PRINT" NON-RECURRING COST ($M) now =";:PRINT USING" ###.#";COST(J,
K);:INPUT" = ";:COST(J,K)
4130 GOTO 4050
4140 FOR J=1 TO NYR:IF IFIRST>-1 THEN PRINT USING" ##";(IYR+J-1) MOD 100;:INP
UT" COST ($M) = ";:COST(J,K) ELSE INPUT #1,COST(J,K)
4150 NEXT J
4160 RETURN
4170 'Change # Years *****
4180 MYR=NYR
4190 PRINT" NUMBER OF YEARS now =";:PRINT USING" ##";MYR;:IN
PUT" = ";NYR
4200 IF NYR>25 THEN PRINT" INPUT ERROR: Years must not exceed 25":BEEP:GOTO 4190
4210 IF NYR<=MYR THEN RETURN
4220 FOR J=MYR+1 TO NYR:JJ=(J+IYR-1) MOD 100:PRINT" YEAR = ";JJ:GOSUB 3180
4230 COST(J,6)=0:COST(J,7)=0:COST(J,8)=0:NEXT J:RETURN
4240 ' Display input data *****
4250 CLS
4260 PRINT SPC(22);D1$,DATES,TIMES
4270 PRINT
4280 PRINT SPC(21);D2$
4290 PRINT SPC(14);D3$
4300 PRINT
4310 NYRP=NYR+1:J=NYRP:Q(J,1)=0:Q(J,2)=0:Q(J,3)=0:COST(J,6)=0:COST(J,7)=0:COST(J
,8)=0
4320 FOR J=1 TO NYRP
4330 IF J<NYRP THEN PRINT USING" ##";(IYR+J-1) MOD 100; ELSE PRINT"
TOTAL";
4340 PRINT USING F90$;Q(J,1);Q(J,2);Q(J,3);:PRINT USING F91$;COST(J,6);COST(J,7)
;COST(J,8)
4350 FOR I=1 TO 3:Q(NYRP,I)=Q(NYRP,I)+Q(J,I):COST(NYRP,I+5)=COST(NYRP,I+5)+COST(
J,I+5):NEXT I
4360 NEXT J:PRINT:PRINT

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4370 PRINT " FIRST UNIT COST";:PRINT USING F93$;A(1);A(2);A(3);:PRINT" DISC
OUNT RATE (%)=";D
4380 PRINT " PROGRESS CURVE ";:PRINT USING F92$;B(1);B(2);B(3);:PRINT" ASSI
GN COMPETITIVE SPLIT"
4390 PRINT " PRODUCTION RATE";:PRINT USING F92$;C(1);C(2);C(3);:PRINT" 1
O MINIMIZE COST? ";:IF IMIN=1 THEN PRINT"YES" ELSE PRINT"NO"
4400 IF NSR=0 THEN 4450
4410 FOR ISR=1 TO NSR
4420 PRINT " SHIFT % ";;PRINT USING F92$;S(2,ISR);S(3,ISR);:IF J
YR(ISR)<>-100 THEN PRINT" YEAR OF SHIFT/ROT=";JYR(ISR) MOD 100 ELSE PRINT"
UNIT OF SHIFT/ROT=";QAMT(ISR)
4430 PRINT " ROTATION % ";;PRINT USING F92$;R(2,ISR);R(3,ISR)
4440 NEXT ISR
4450 IF QS<>"P" AND QS<>"p" THEN RETURN
4460 INPUT" Title or <cr>";TS
4470 LPRINT TS
4480 LPRINT:LPRINT:SPC(22);D1$,DATES,TIMES
4490 LPRINT:LPRINT:SPC(21);D2$
4500 LPRINT:SPC(14);D3$
4510 LPRINT
4520 NYRP=NYR+1:J=NYRP:Q(J,1)=0:Q(J,2)=0:Q(J,3)=0:COST(J,6)=0:COST(J,7)=0:COST(J
,8)=0
4530 FOR J=1 TO NYRP
4540 IF J<NYRP THEN LPRINT USING" ##";(IYR+J-1) MOD 100; ELSE LPRIN
T" TOTAL";
4550 LPRINT USING F90$;Q(J,1);Q(J,2);Q(J,3);:LPRINT USING F91$;COST(J,6);COST(J,
7);COST(J,8)
4560 FOR I=1 TO 3:Q(NYRP,I)=Q(NYRP,I)+Q(J,I):COST(NYRP,I+5)=COST(NYRP,I+5)+COST(
J,I+5):NEXT I
4570 NEXT J:LPRINT:LPRINT
4580 LPRINT " FIRST UNIT COST";:LPRINT USING F93$;A(1);A(2);A(3);:LPRINT" D
ISCOUNT RATE (%)=";D
4590 LPRINT " PROGRESS CURVE ";:LPRINT USING F92$;B(1);B(2);B(3);:LPRINT" A
SSIGN COMPETITIVE SPLIT"
4600 LPRINT " PRODUCTION RATE";:LPRINT USING F92$;C(1);C(2);C(3);:LPRINT"
TO MINIMIZE COST? ";:IF IMIN=1 THEN LPRINT"YES" ELSE LPRINT"NO"
4610 IF NSR=0 THEN RETURN
4620 FOR ISR=1 TO NSR
4630 LPRINT " SHIFT % ";;LPRINT USING F92$;S(2,ISR);S(3,ISR);:IF
JYR(ISR)<>-100 THEN LPRINT" YEAR OF SHIFT/ROT=";JYR(ISR) MOD 100 ELSE LPRI
NT" UNIT OF SHIFT/ROT=";QAMT(ISR)
4640 LPRINT " ROTATION % ";;LPRINT USING F92$;R(2,ISR);R(3,ISR)
4650 NEXT ISR
4660 RETURN
4670 'Subroutine CHANGE *****
4680 PRINT:PRINT" (S)ole Source, (1)st Competitive, (2)nd Competitive, (M)enu u
p"
4690 INPUT" ENTER THE APPROPRIATE LETTER OR NUMBER";RS
4700 ICHG=0:IF RS="S" OR RS="s" THEN I1=1:ICHG=1
4710 IF RS="1" THEN I1=2:ICHG=1
4720 IF RS="2" THEN I1=3:ICHG=1
4730 IF RS="M" OR RS="m" THEN I1=4:ICHG=1
4740 IF ICHG=1 THEN RETURN ELSE 4680
4750 'Subroutine CHANGE SHIFT, ROTATION *****
4760 PRINT:IF NSR=0 THEN PRINT" There are no shifts/rotations now. If desired c
hange #.":I1=4:IF H=1 THEN GOSUB 6190:RETURN ELSE RETURN
4770 PRINT:PRINT" Enter # S/R to change ( there are now";NSR;) or (M)enu up";:
INPUT QS
4780 IF QS="M" OR QS="m" THEN I1=4:RETURN
4790 ISR=VAL(QS)
4800 IF ISR<1 OR ISR>NSR THEN 4770

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4810 PRINT:PRINT" (1)st Competitive, (2)nd Competitive, (M)enu up"
4820 INPUT" ENTER THE APPROPRIATE LETTER OR NUMBER";RS
4830 ICHG=0:IF RS="1" THEN I1=2:ICHG=1
4840 IF RS="2" THEN I1=3:ICHG=1
4850 IF RS="M" OR RS="m" THEN I1=4:ICHG=1
4860 IF ICHG=1 THEN RETURN ELSE 4760
4870 'Subroutine to CHANGE TIME OF S/R *****
4880 PRINT:IF NSR=0 THEN PRINT" There are no shifts/rotations now. If desired c
change #.:I1=4:RETURN
4890 PRINT:PRINT" Enter # S/R to change ( there are now";NSR;" ) ";;INPUT ISR
4900 IF ISR<1 OR ISR>NSR THEN 4890
4910 IF QAMT(ISR)>0 THEN 4990
4920 PRINT" SHIFT/ROTATION #";:PRINT USING" #";ISR;;PRINT" :YEAR =" :QAMT(ISR)
=0
4930 IF JYR(ISR)>-100 THEN PRINT" now =" :PRINT JYR(ISR) MOD 100; ELSE PRIN
T SPC(12);
4940 PRINT SPC(30);:INPUT JYR(ISR)
4950 IF JYR(ISR)-IYR+1<0 THEN JYR(ISR)=JYR(ISR)+100
4960 IF JYR(ISR)-IYR+1>NYR THEN PRINT" INPUT ERROR - YEAR IS TOO LARGE":BEEP:GOT
O 4920
4970 IF ISR>1 AND JYR(ISR)<=JYR(ISR-1) THEN PRINT" INPUT ERROR - MUST BE LARGER"
:PRINT" PREVIOUS YEAR WAS ";JYR(ISR-1):BEEP:GOTO 4920
4980 RETURN
4990 PRINT" SHIFT/ROTATION #";:PRINT USING" #";ISR;;PRINT" :SOLE SOURCE UNIT
AT WHICH S/R OCCURS":JYR(ISR)=-100
5000 IF QAMT(ISR)>0 THEN PRINT" now =" :QAMT(ISR); ELSE PRINT SPC(20);
5010 PRINT SPC(20);:INPUT QAMT(ISR)
5020 IF ISR>1 AND QAMT(ISR)<=QAMT(ISR-1) THEN PRINT" INPUT ERROR - MUST BE LARGE
R":PRINT" PREVIOUS AMOUNT WAS ";QAMT(ISR-1):BEEP:GOTO 4990
5030 IF QAMT(ISR)=0 THEN 4990
5040 RETURN
5050 'Subroutine WRITE File *****
5060 INPUT " Name of Output Data File (8 char or less: do not type .CAM) ";NFS
5070 CLOSE:NFS=NFS+".CAM":OPEN "O",#2,NFS
5080 PRINT #2,NYR:IYR:D
5090 FOR J=1 TO NYR-1:PRINT #2,COST(J,6);:NEXT J:PRINT #2,COST(NYR,6)
5100 FOR J=1 TO NYR:PRINT #2,Q(J,1);:NEXT J:PRINT #2,A(1);B(1);C(1)
5110 FOR J=1 TO NYR-1:PRINT #2,COST(J,7);:NEXT J:PRINT #2,COST(NYR,7)
5120 FOR J=1 TO NYR-1:PRINT #2,Q(J,2);:NEXT J:PRINT #2,Q(NYR,2)
5130 FOR J=1 TO NYR-1:PRINT #2,Q(J,3);:NEXT J:PRINT #2,Q(NYR,3);:PRINT #2,A(2
);B(2);C(2)
5140 FOR J=1 TO NYR-1:PRINT #2,COST(J,8);:NEXT J:PRINT #2,COST(NYR,8)
5150 PRINT #2,A(3);B(3);C(3);
5160 PRINT #2,NSR:IF NSR=0 THEN 5190
5170 FOR ISR=1 TO NSR:PRINT #2,JYR(ISR);QAMT(ISR);:NEXT ISR
5180 FOR ISR=1 TO NSR:PRINT #2,S(2,ISR);S(3,ISR);R(2,ISR);R(3,ISR);:NEXT ISR
5190 PRINT #2,IMIN
5200 CLOSE 2:RETURN
5210 'Subroutine compute lot costs *****
5220 IF QQ=0 THEN RETURN
5230 CST=CST+AA*(((QNEW+.5)^BP1-(QOLD+.5)^BP1)*QQ^CP1)/BP1
5240 IF H=0 OR II>3 THEN RETURN
5250 PRINT:PRINT" B+1 B+1 C"
5260 PRINT" COST = [A/(B+1)] [(Q1+.5) - (Q0+.5) ]Q =":PRINT USING F93$;CST
5270 PRINT" A = FIRST UNIT COST =":PRINT USING F93$;AA;
5280 PRINT TAB(58);:IF II=1 THEN PRINT"SOLE SOURCE ";
5290 IF II=2 THEN PRINT"1ST COMPETITIVE ";
5300 IF II=3 THEN PRINT"2ND COMPETITIVE ";

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5310 PRINT USING"##";(IYR+J-1) MOD 100
5320 PRINT" B+1 = LOG(.01*PROGRESS RATE)/LOG(2)+1 = ";;PRINT USING F85$;BP1
5330 PRINT" C = LOG(.01*PRODUCTION RATE)/LOG(2) = ";;PRINT USING F85$;CP1
5340 PRINT" Q = LOT SIZE = ";;PRINT USING F80$;QQ
5350 PRINT" Q0 = PREVIOUS PRODUCTION = ";;PRINT USING F80$;QOLD
5360 PRINT" Q1 = Q0 + Q = ";;PRINT USING F80$;QNEW
5370 PRINT:INPUT"ENTER (H)elp OFF, Shift PrtScr to Print, or RETURN TO CONTINUE"
;RS
5380 IF RS="H" OR RS="h" THEN H=(H+1) MOD 2
5390 RETURN
5400 PRINT:PRINT" The Progress Rate accounts for learning over time that reduces
cost"
5410 PRINT" - e.g. 90% means that the unit cost of the 2Nth unit will drop to 90
% of the":PRINT" cost for the Nth unit. A value of 100% has no effect. Typical v
alues 85%-95%":RETURN
5420 PRINT:PRINT" The Production Rate accounts for decreases in cost due to larg
er lot sizes.":PRINT" These cost reductions are in addition to those that occur
over time"
5430 PRINT" - e.g. 95% means that if the lot size in a year doubles, the cost of
the 2Nth":PRINT" unit drops to 95% of the Nth unit cost. A value of 100% has no
effect."
5440 PRINT" Typical values are 95% - 100%":RETURN
5450 PRINT:PRINT" It is sometimes desirable to represent the effects of competit
ion":PRINT" by a downward shift or a steepening rotation in the progress rate
"
5460 PRINT" at the point when competition begins. There may be up to five of
these":PRINT" shift/rotation points affecting the 1st or 2nd competitive sour
ce":PRINT" or both. Sole source curves are unaffected."
5470 PRINT:PRINT" The point at which shift/rotation occurs is specified by year
or unit #:PRINT" of the sole source producer. If the year is specified, it m
eans that the"
5480 PRINT" shift/rotation affects all units produced in that year by the 1st
or 2nd":PRINT" competitive source. Suppose a unit # is specified so that 40%
of the"
5490 PRINT" sole source production in a year precedes the shift/rotation. The
n under":PRINT" competition, 60% of production from each competitive source d
uring that"
5500 PRINT" year and all subsequent production will be based on the new value
s for":PRINT" shift/rotation.":PRINT:RETURN
5510 PRINT:PRINT" Shift % is typically no more than 1% - 3%":PRINT" A temporary
shift can be cancelled by a negative value at a later time.":RETURN
5520 PRINT:PRINT" Rotation % is typically no more than 1% - 3%":PRINT" A tempor
ary rotation can be cancelled by a negative value at a later time.":RETURN
5530 IF ERR=53 AND NFILE=0 THEN PRINT" No Data Files":PRINT:RESUME 280
5540 IF ERR=53 THEN PRINT" File not Found"
5550 IF ERR=10 OR ERR=62 OR ERR=66 THEN PRINT" File not Useable"
5560 PRINT:RESUME 260
5570 CLS:PRINT" There are three types of breakeven analysis that may be selected
.":PRINT" The first two assume that the Sole Source and 1st Competitive Source":
PRINT" costs and quantities are known. All 2nd Competitive Source costs are know
n"
5580 PRINT" except first unit cost or the progress curve rate. You may include"
5590 PRINT" shifts/rotations for the second source, if desired. The computer sol
ves for"
5600 PRINT" the 2nd Competitive Source parameter value that equates costs under
Sole"
5610 PRINT" and Competition.":PRINT
5620 PRINT" The third option adjusts the total quantity in the program to obtain
"

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5630 PRINT" breakeven."
5640 PRINT:GOSUB 6190
5650 CLS:PRINT" (A) First Unit Cost Solution - The computer solves for the cost
of the first""
5660 PRINT"      unit produced by the 2nd Competitive Source that would result in
the same"
5670 PRINT"      total cost with or without competition. It is assumed that all o
ther 2nd"
5680 PRINT"      Source values are known."
5690 PRINT:PRINT" (B) Progress Curve Solution - The computer solves for the prog
ress rate":PRINT"      of the 2nd Competitive Source that would result in the sam
e total cost"
5700 PRINT"      with or without competition. It is assumed that all other 2nd So
urce":PRINT"      values are known."
5710 PRINT:PRINT" (Q) Quantity Solution - The computer solves for the reduced pr
ogram":PRINT"      quantity at which the costs are equal under Sole Source and Co
mpetition."
5720 PRINT"      This option is available only if the base case has competitive s
avings."
5730 PRINT:PRINT" (M)enu end and move to higher level menu"
5740 INPUT" ENTER THE APPROPRIATE LETTER";RS
5750 IF RS="M" OR RS="m" THEN 900
5760 PRINT:PRINT" Breakeven calculations in progress - Please be patient"
5770 IF RS="A" OR RS="a" THEN 5930
5780 IF RS="B" OR RS="b" THEN 5810
5790 IF RS="Q" OR RS="q" THEN 6050
5800 BEEP:GOTO 5650
5810 'Breakeven calculation progress curve *****
5820 IEVEN=1:BOLD=B(3):IMINOLD=IMIN:IMIN=0:HOLD=H:H=0
5830 UP=110:B(3)=UP:GOSUB 1690:CUP=COST(NYRP,9):IF CUP<0 THEN 5850
5840 PRINT:PRINT" Breakeven Slope Exceeds 110% - Abort Calculation":BEEP:GOTO 59
10
5850 DN=70:B(3)=DN:GOSUB 1690:CDN=COST(NYRP,9):IF CDN>0 THEN 5870
5860 PRINT:PRINT" Breakeven Slope Below 70% - Abort Calculation":BEEP:GOTO 5910
5870 B(3)=(UP+DN)/2:GOSUB 1690:IF COST(NYRP,9)>0 THEN CDN=COST(NYRP,9):DN=B(3) E
LSE CUP=COST(NYRP,9):UP=B(3)
5880 IF ABS(CUP-CDN)>.04 THEN 5870
5890 CLS:PRINT" Breakeven Slope for Second Source";:PRINT USING" ###.##";B(3):;P
RINT SPC(10);"Originally";:PRINT USING" ###.##";BOLD:PRINT
5900 GOSUB 2380:GOTO 5920
5910 PRINT:GOSUB 6190
5920 IEVEN=0:B(3)=BOLD:IMIN=IMINOLD:H=HOLD:GOTO 5650
5930 'Breakeven calculation first unit cost *****
5940 IEVEN=1:AOLD=A(3):IMINOLD=IMIN:IMIN=0:HOLD=H:H=0
5950 UP=A(1)*2:A(3)=UP:GOSUB 1690:CUP=COST(NYRP,9):IF CUP<0 THEN 5970
5960 PRINT:PRINT" First Unit Cost Exceeds 200% of Sole Source Cost - Abort Calcu
lation":BEEP:GOTO 6030
5970 DN=A(1)*.5:A(3)=DN:GOSUB 1690:CDN=COST(NYRP,9):IF CDN>0 THEN 5990
5980 PRINT:PRINT" First Unit Cost Below 50% of Sole Source Cost- Abort Calculat
on":BEEP:GOTO 6030
5990 A(3)=(UP+DN)/2:GOSUB 1690:IF COST(NYRP,9)>0 THEN CDN=COST(NYRP,9):DN=A(3) E
LSE CUP=COST(NYRP,9):UP=A(3)
6000 IF ABS(CUP-CDN)>.04 THEN 5990
6010 CLS:PRINT" Breakeven 1st Unit Cost for Second Source ($M)";:PRINT USING F93
S:A(3):;PRINT SPC(5);"Was";:PRINT USING F93$:AOLD:PRINT
6020 GOSUB 2380:GOTO 6040
6030 PRINT:GOSUB 6190
6040 IEVEN=0:A(3)=AOLD:IMIN=IMINOLD:H=HOLD:GOTO 5650
6050 'Breakeven calculation quantity *****
6060 IEVEN=1:IMINOLD=IMIN:IMIN=0:HOLD=H:H=0

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6070 GOSUB 1690:CUP=COST(NYRP,9):UP=0:FOR J=1 TO NYR:UP=UP+Q(J,1):FOR K=1 TO 3:Q
2(J,K)=Q(J,K):NEXT K:NEXT J
6080 IF COST(NYRP,9)<0 THEN PRINT:PRINT" Quantity Breakeven not allowed as Compe
tition leads to Losses":GOTO 6160
6090 Q9=UP:DN=CINT(UP*.5):Q1=DN:GOSUB 6230:GOSUB 1690:CDN=COST(NYRP,9):IF CDN<0
THEN 6110
6100 PRINT:PRINT" Quantity Reduction for Breakeven Exceeds 50% - Abort Calculati
on":BEEP:GOTO 6160
6110 Q1=CINT((UP+DN)/2):GOSUB 6230
6120 GOSUB 1690:IF COST(NYRP,9)<0 THEN CDN=COST(NYRP,9):DN=Q1 ELSE CUP=COST(NYRP
,9):UP=Q1
6130 IF ABS(CUP-CDN)>.04 AND UP-DN>1 THEN 6110
6140 CLS:PRINT" Reduced Quantity for Breakeven ";;PRINT USING F90$;Q1;;PRINT SPC
(10);"Originally ";;PRINT USING F90$;Q9:PRINT
6150 GOSUB 2380:GOTO 6170
6160 PRINT:GOSUB 6190
6170 FOR J=1 TO NYR:FOR K=1 TO 3:Q(J,K)=Q2(J,K):NEXT K:NEXT J
6180 IEVEN=0:IMIN=IMINOLD:H=HOLD:GOTO 5650
6190 'Press any key subroutine
6200 PRINT" PRESS ANY KEY TO CONTINUE"
6210 QS=INKEYS:IF QS="" THEN 6210
6220 RETURN
6230 'Allocate total quantity to years
6240 QOLD=0:FOR J=1 TO NYR:JJ=J:IF QOLD+Q2(J,1)>=Q1 THEN FRACT=(Q1-QOLD)/Q2(J,1)
:GOTO 6260
6250 QOLD=QOLD+Q2(J,1):NEXT J
6260 FOR J=1 TO NYR:FR=1!:IF J=JJ THEN FR=FRACT
6270 IF J>JJ THEN FR=0
6280 FOR K=1 TO 2:Q(J,K)=CINT(Q2(J,K)*FR):NEXT K:Q(J,3)=Q(J,1)-Q(J,2):NEXT J
6290 RETURN

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10 'COMPETITION ANALYSIS MODEL      "CAM3.BAS"
20 DEFINT I-K,M,N
30 COMMON IW
40 CLS
50 PRINT TAB(30);"FEASIBILITY ANALYSES"
51 PRINT:PRINT      The feasibility analysis option allows the CAM user to esti
mate"
52 PRINT" likely (feasible) price reductions for specific industries, and if dat
a"
53 PRINT" is available, for individual firms. The basic analytical procedures ar
e"
54 PRINT" described in Chapter V of Volume I."
55 PRINT:PRINT      CAM will ask you to enter the appropriate values for direct
labor,"
56 PRINT" material costs (including sub-contractors), indirect labor, and overhe
ad"
57 PRINT" costs all as a percentage of sales. Chapter IV of Volume II of the CAM
"
58 PRINT" User's Guide presents average values for 10 years for 22 industries (S
IC"
59 PRINT" four digit codes) for use as reference. Appendix A of Volume I present
s"
60 PRINT" annual values for these same categories and industries."
61 PRINT:PRINT      The final input required is the percent reduction expected
for the"
62 PRINT" categories of direct labor and material. Estimated price reductions ar
e"
63 PRINT" quite sensitive to this figure so it should be chosen with care."
64 PRINT:PRINT" PRESS ANY KEY TO CONTINUE"
65 QS=INKEYS:IF QS="" THEN 65
70 CLS:PRINT" The formula for price reduction is:"
72 PRINT:PRINT"  $PR = OH - .4*DL - .1*MC - 1.4*IL + C*(DL + MC)$ "
73 PRINT:PRINT" where PR = Price Reduction (%)      MC = Material Costs (%)"
74 PRINT"      OH = Overhead Rate (%)      IL = Indirect Labor (%)"
75 PRINT"      DL = Direct Labor (%)      C = Constant - often set to .1"
76 PRINT:PRINT" NOTE: OH + DL + MC MUST EQUAL 100"
77 PRINT"      IL must not exceed DL"
78 PRINT:INPUT" Overhead Rate (%)      ";OVR
79 INPUT" Direct Labor (%)      ";DL
80 INPUT" Material Costs (%)      ";XM
90 INPUT" Indirect Labor (%)      ";XL
95 INPUT" Multiplicative Constant (often .1)      ";C
100 PR=OVR-.4*DL-.1*XM-1.4*XL+C*(DL+XM)
110 PRINT:PRINT" Price Reduction (%)";:PRINT USING "###.##";PR
115 T=OVR+DL+XM: IF T<>100 THEN PRINT" OH + DL + MC =";T
116 IF XL>DL THEN PRINT" IL exceeds DL"
120 PRINT:INPUT" Do you want to do feasibility again (Y/N)";QS
130 IF QS="Y" OR QS="y" THEN 70
140 IF QS<>"N" AND QS<>"n" THEN BEEP:GOTO 120
150 CLS:PRINT" Loading computation program"
160 CHAIN "CAM2"

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